55Zh6UE NEBO-UE

Radar

Mission

The 55Zh6UE Nebo-UE radar is designed to detect, automatically track and determine coordinates and flight parameters of air targets including low-observable, small-size and ballistic ones; to feed radar data to users; to identify aircraft as friend or foe; to display individual and flight data on the radar operators workstations and to classify targets by their trajectory parameters.

The Nebo-UE mobile medium- and high-altitude 3D digital phased array radar can be integrated into both automated and non-automated control systems of air force and air defence units.

Features

- phased array antenna
- precision detection of small-size and stealth targets
- advanced techniques to suppress natural clutter and active jammers
- all-track data processing with automatic lock-on, tracking and trajectory identification of aerial targets

- ability to integrate into any Russian or foreign-made automated control systems, including integration/coupling with air defence gun/missile systems
- continuous automated built-in functional testing and fault detection system

Composition

The Nebo-UE radar comprises electronic equipment suite (the AP cabin), an antenna mast assembly mounted on three semi-trailers, a remote display device (the UV cabin); the 19U6 self-contained power supply system, a set of cable links, connecting with the UV cabin and automated control system; an SPTA set.

The radar can operate in various climates, at ambient temperatures ranging from -50°C to +50°C, relative air humidity of 98% and wind speed of up to 30 m/s at 1,000 m above sea level.

Nebo-UE has no analogues in the world. If compared with the Martello 743D radar, the Nebo-UE's most close and best foreign-made counterpart, the Nebo-UE radar features 1.5-times greater maximum detection range and altitude, at similar power consumption and detection accuracy.

Basic specifications	
Waveband	metric
Fighter-type target (RCS = 2.5 sq.m) detection range, km, not less than:	
at 500 m	65
at 10,000 m	310
at 20,000 m	400
Hypersonic cruise missile (RCS – 0.9 sq.m) detection range, km, not less than:	
at 10,000 m	250
at 20,000 m	300
Top boundary of operational coverage and coordinates measurement area:	
altitude, km	65
elevation, deg	16
Coordinates measurement accuracy:	
range, m	60
azimuth, ang. min	10
altitude, m:	
at 2-16° elevation	400
at 0.8-2° elevation	600
Number of target tracks processed	not less than 100
Mean time between failures, hrs	not less than 250

OBORONA-14

Radar Modernisation

Mission

The Oborona-14 radar modernisation is carried out to replace cathode-ray vacuum-tube components with solid-state devices and improve radar technical and operational characteristics, including:

- jamming resistance to passive, asynchronous pulse jamming and clutter from local objects;
- data processing capacity;
- data exchange within automated air defence systems, as well as fusing and identification of data received from several radars and other sources;
- reliability and service life.

Composition

The equipment intended for modernisation includes:

- digital ECCM equipment for protection from passive and asynchronous jamming;
- automatic radar data pick-up equipment and data collection set.

The ECCM equipment based on detachable functional cells is integrated into a single line replaceable unit. It ensures simultaneous electronic protection of the radar from passive and asynchronous jamming in the coherent zone, and from asynchronous jamming in the amplitude zone, without loosing quality within the entire radar coverage zone.

The data pick-up equipment is mounted in the radar equipment van instead of the remotely-mounted plan position indicator. Mounting dimensions of the pick-up equipment and PPI are the same.

The data collection equipment is mounted on stationary command and control posts. Distance from the data collection equipment to the radar is not limited and depends on communications channels available on site.

Both data pick-up and collection equipment are computer-based.

Basic specifications

	Before modernisation	After modernisation
Clutter suppression ratio, dB	20	26
Passive interference suppression ratio, dB	20	26
Simultaneous interference suppression ratio in coherent zone, dB, not less than:		
passive interference	20	26
asynchronous interference	-	26
Compensation of asynchronous interference in amplitude zone, dB	20	26
Automatic display of radar data/target track forming	n/a	available
Automatic tracking of jammers' bearings	n/a	available
Throughput (number of targets processed within a 10-sec scanning period)	up to 10 (visual reading)	up to 120 (automatically)

NEBO-SVU

Radar

Mission

The Nebo-SVU radar is designed to automatically detect, measure co-ordinates of and track a wide range of modern airborne platforms, including strategic and tactical aircraft, ASALM-type air-launched missiles, ballistic targets such as small-size hypersonic cruise missiles warheads, low-observable targets, in particular those embodying stealth technology; to identify targets as friend or foe; to detect active ECM threats; to transfer radar surveillance data to automated control systems, and to display individual and flight-related information at the radar's workstations.

The Nebo-SVU mobile phased-array radar can be integrated into both automated and non-automated control systems of air force and air defence units.

Basic specifications	
Waveband	metric
Detection range (fighter-type target RCS = 2.5 sq.m), km, not less than:	
at 500 m	50
at 10,000 m	250
at 20,000 m	350
Top boundary of coverage area:	
in regular circular scan mode, not less than:	
altitude, km	100
elevation, ang. deg	25
in tracking mode:	
altitude, km	180
elevation, ang. deg	45-50
Coordinates measurement accuracy:	
range, m	400
azimuth, ang. min	30
elevation (for angles exceeding 5 deg), ang. deg	1.5
Jamming immunity, dB:	
clutter	45
passive interference	30
active noise jamming	28
Number of tracked targets	not less than 100
Mean time between failures, hrs	not less than 250
Deployment/out-of-action time, min	25

Features

- phased array antenna
- fully-digital space-time signals pre-processing
- signal processing system's ability to adapt it to the clutter, jamming and radar's technical condition
- high-capacity digital moving-target indication system
- adaptive suppression of side lobes of the array's directional pattern

Composition

The Nebo-SVU radar comprises antennas and electronic equipment, mounted on a semi-trailer; and the autonomous electric power plant, based on the ED-2x30-T400-1RA1M4 diesel-engine power plant, carried by the KamAZ truck.

The radar can operate in any climate at ambient temperatures between –50°C and +50°C, with relative air humidity of 98%.

The Nebo-SVU radar has no analogues in the world.

P-18

Radar Upgrade (Version 1)

Purpose

The P-18 radar modernisation programme is proposed to improve its tactical-technical and maintenance characteristics, namely:

- to increase accuracy of target coordinates measurement;
- to enhance radar's ECCM capability;
- to improve reliability characteristics;
- to extend radar's service life.

The programme is intended to replace existing electronic equipment with an installation kit to be fitted directly in the radar's equipment van.

Composition of the installation kit

- 259-1 case with solid-state transceivers, housed in three racks, with six cells in each
- two PMO1 cases with Baget 01-05 computer
- one PMO2 case with Baget 01-05 computer
- software package
- aerial feeders
- SOCT equipment
- power-on unit
- interface cables

The modernisation programme envisages:

- introduction of radar signals digital processor;
- introduction of active noise jamming autosuppression system;
- replacement of tube transmitter with a solid-state one;
- introduction of a computerised operator workstation, secondary data processing systems, and computerised test equipment;
- replacement of the obsolete radar components with modern ones;
- introduction of track data processing and a capability to link the radar with modern automated control systems.

Thus, the modernisation will result in creating an all-new modern VHF (metric-wave) radar, capable of efficiently monitoring airspace within a specified sector in severe ECM environment.

Small dimensions of the installation kit allow the P-18 radar to be upgraded directly at the customer facilities.

Basic specifications

	P-18	P-18 upgrade
MiG-21-type target detection range, POD=0.8, km:		
at 3,000 m	110	110
at 10,000 m	180	180
at 20,000 m	260	260
MiG-21-type target detection range (at active noise direct-barrage jamming spectral density of 200 W/MHz), km:		
at 3,000 m	-	88
at 10,000 m	-	152
at 20,000 m	-	170
Coordinates determination accuracy:		
range, m	1,400	250
azimuth, deg	47	25
Active noise direct-barrage jamming suppression ratio, dB	-	25*
Clutter suppression ratio, dB	20	not less than 45
Number of tracked targets	-	up to 120
Mean time between failures, hrs	-	20,000 - 25,000
Installation kit service life, years	-	not less than 12

* - with jamming-to-noise signal ratio of 24-40 dB